

REMARKS

Applicant has amended claims 1-7 and 8. Applicant respectfully submits that these amendments to the claims are supported by the application as originally filed. In addition, Applicant respectfully submits that in view of Applicant's arguments in Applicant's prior response and the description of Applicant's invention contained in the application, these amendments to the claims do not raise any new issue which would require further consideration and/or search. Accordingly, the Final Office Action will be discussed in terms of the claims as amended.

The Examiner has rejected claims 1, 2, 5(2) and 8(5(2)) under 35 USC 102 as being anticipated by Wickramasinghe et al. (USP '698), stating that USP '698 discloses a heat emitting probe comprising a conductive nanotube probe needle 27 with a base end portion thereof fastened to a holder 24 and a tip end portion 44 thereof protruding, a heat emitting body 52 provided on a circumferential surface of said conductive nanotube needle as shown in Fig. 2, a conductive nanotube lead wire fastened to the heat emitting body 52 and means 54 for causing electric current to pass through both ends of said conductive nanotube lead wire and said conductive nanotube probe needle wherein an electric current is caused to pass through said heat emitting body.

In reply thereto, Applicant has carefully reviewed USP '698 and respectfully submits that disclosed therein is the utilization of tungsten tips which are produced using electropolishing technique. In contrast thereto, Applicant's invention utilizes carbon nanotubes produced by a catalytic chemical vapor deposition method or by a carbon arc method and the carbon nanotube has a cross-sectional diameter from one to several tens of nanometer. Applicant further respectfully submits that the tungsten tips in USP '698 produced by an electropolishing technique cannot be reliably produced at such small size. In contrast thereto, Applicant's invention provides a practical nanotube probe which can be reliably produced and utilized. Still further, the heat emitting probe in Applicant's invention is created by adhering two carbon nanotubes to the heat emitting body; while the scanning tip of USP '698 is formed of electrically conductive materials such as tungsten and is therefore a very hard metallic substance which can easily damage the sample surface. In contrast thereto, the present invention's carbon nanotubes are formed of graphite sheet and has some resiliency. As a result, the carbon nanotube of Applicant's invention can be utilized without damage to the sample surface. Still further,

Applicant respectfully submits that while bulk tungsten has a high fusing point of about 3380 °C, Applicant respectfully submits that the fusing point of a tungsten tip with the diameter of approximately 10 nm will decrease to several hundred degrees C and will become considerably smaller than the fusing point of bulk tungsten. Therefore, Applicant respectfully submits that if the tips are made of tungsten and used as an electrically conductive probe needle for a heat emitting probe heated at a high temperature, the metal will evaporate from the tip end portion and the durability of metal tips of approximately 10 nm in diameter will become very low. In contrast thereto, the fusing point of the carbon nanotube of Applicant's invention is higher than 3500 °C. As a result, Applicant's invention has the advantage over that of USP '698 of being of high durability when utilized with a heat emitting probe.

In view of the above, Applicant respectfully submits that Wickramasinghe et al. does not teach each and every element of Applicant's invention as claimed and claims 1, 2, 5(2) and 8(5(2)) are not anticipated thereby.

The Examiner has further rejected claims 3, 4, 5(3), 5(4) and 8(5(3), 5(4)) under 35 USC 103 as being obvious over Wickramasinghe et al. in view of Suzuki et al., stating that USP '698 discloses a heat emitting probe as claimed, but fails to disclose an atomic force microscope cantilever; Suzuki et al. teaches that it is well known in the art to combine a scanner thermal profiler with an AFM probe; and it would have been obvious to modify USP '698 in view of the teachings of Suzuki et al.

In reply thereto, Applicant would like to incorporate by reference the comments above concerning Applicant's invention and USP '698. In addition, Applicant has carefully reviewed Suzuki et al. and respectfully submits that Suzuki et al. teaches a heat topograph measuring device which is quite different from that of USP '698 and does not teach a cantilever utilizing a nanotube probe and particularly a carbon nanotube probe.

In view of the above, therefore, Applicant respectfully submits that the combination suggested by the Examiner is not Applicant's invention. Still further, Applicant respectfully submits that in view of the fact that Suzuki et al. is from a different art and is not from an analogous art, one of ordinary skill in the art would not look to Suzuki et al. to combine it with USP '698. Therefore, Applicant respectfully submits that the combination suggested by the Examiner is not suggested by the art. Therefore, Applicant respectfully submits that the claims are not obvious over Wickramasinghe et al. in view of Suzuki et al.

The Examiner has rejected claim 6(5(2)) under 35 USC 103 as being obvious over Wickramasinghe et al., stating that it discloses a heat emitting probe, but fails to disclose that the sample would be a thermal recording medium and the tip end of the conductive nanotube probe needle being heated by the heat emitting probe wherein the information is recorded by means of a hole pattern formed in a surface of the thermal recording medium; however, it is the Examiner's opinion that such limitations are directed to intended use.

In reply thereto, Applicant would like to incorporate by reference the comments above concerning Applicant's invention and USP '698 and respectfully submits that claim 6(5(2)) is not obvious over Wickramasinghe et al.

The Examiner has further rejected claim 6(5(3)) and 6(5(4)) under 35 USC 103 as being obvious over Wickramasinghe et al. in view of Suzuki et al. and further in view of Hamann, stating that Wickramasinghe et al. and Suzuki et al. disclose each and every element of Applicant's invention, but fail to disclose the sample being a thermal recording medium and the tip end of the conductive nanotube probe needle being heated by the heat emitting probe; Hamann teaches the use of an AFM probe having a heat emitting structure/heat source, in a magnetic thermal recording and reproducing assembly; and it would have been obvious to modify the combination of Wickramasinghe et al. and Suzuki et al. in view of the teachings of Hamann.

In reply thereto, Applicant would like to incorporate by reference the comments above concerning Applicant's invention, Wickramasinghe et al. and Suzuki et al. In addition, Applicant has carefully reviewed Hamann and respectfully submits that while Hamann may disclose the use of an AMF probe, the dimensions of Hamann are not micrometer size and the smaller size is 20 nm and is therefore not in the dimensional sense of a nanotube which requires a diameter 1 nm. Therefore, Applicant respectfully submits that one of ordinary skill in the art would not look to Hamann since the sizes in Hamann are much greater than those of Applicant's invention and would not make the combination suggested by the Examiner

In view of the above, therefore, Applicant respectfully submits that not only is the combination suggested by the Examiner not Applicant's invention but also the combination suggested by the Examiner would not be suggested to one of ordinary skill in the art. Therefore, Applicant respectfully submits that claim 6(5(3)) and 6(5(4)) are not obvious Wickramasinghe et al. in view of Suzuki et al. and further in view of Hamann.

The Examiner has rejected claim 7(5(2)) under 35 USC 103 as being obvious over Wickramasinghe et al. in view of Fischer, stating that Wickramasinghe et al. discloses a heat emitting probe as claimed, but fails to disclose detecting thermal conductivity distribution of the sample surface by means of variations; Fischer shows the use of a thermoelectric microprobe; and it would have been obvious to modify Wickramasinghe et al. in view of the teachings of Fischer.

In reply thereto, Applicant would like to incorporate by reference the comments above concerning Applicant's invention and Wickramasinghe et al. In addition, Applicant has carefully reviewed Fischer and respectfully submits that the micro probe thereof has a radius of 10 nm and as such is substantially bigger than the 1 nm diameter nanotube probe of Applicant's invention. Accordingly, Applicant respectfully submits that one of ordinary skill in the art would not be motivated by the teachings of Fischer to combine it with Wickramasinghe et al.

In view of the above, therefore, Applicant respectfully submits that claim 7(5(2)) is not obvious over Wickramasinghe et al. in view of Fischer.

The Examiner has rejected claim 7(5(3)) and 7(5(4)) under 35 USC 103 as being obvious over Wickramasinghe et al. in view of Suzuki et al. and further in view of Fischer, stating that the combination of Wickramasinghe et al. and Suzuki et al. disclose Applicant's invention except for the thermal conductivity distribution detection of the sample surface; Fischer shows the use of a thermoelectric microprobe; and it would have been obvious to modify the combination of Wickramasinghe et al. and Suzuki et al. in view of the teachings of Fischer.

In reply thereto, Applicant would like to incorporate by reference the comments above concerning Applicant's invention, Wickramasinghe et al., Suzuki et al. and Fischer. As a result, Applicant respectfully submits that the claims are not obvious thereover.

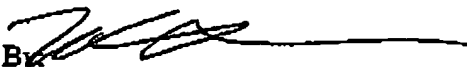
Applicant further respectfully and retroactively requests a two month extension of time so as to respond to the Final Office Action. Please charge Deposit Account No. 11-1445 in the sum of \$210.00 as the fee.

In view of the above, therefore, it is respectfully requested that this Amendment be entered, favorably considered and the case passed to issue.

Please charge any additional costs incurred by or in order to implement this Amendment or required by any requests for extensions of time to KODA & ANDROLIA DEPOSIT ACCOUNT NO. 11-1445.

Respectfully submitted,

KODA & ANDROLIA

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 William L. Androlia

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